



Federal Ministry
for Economic Affairs
and Energy



Long term planning for the power sector

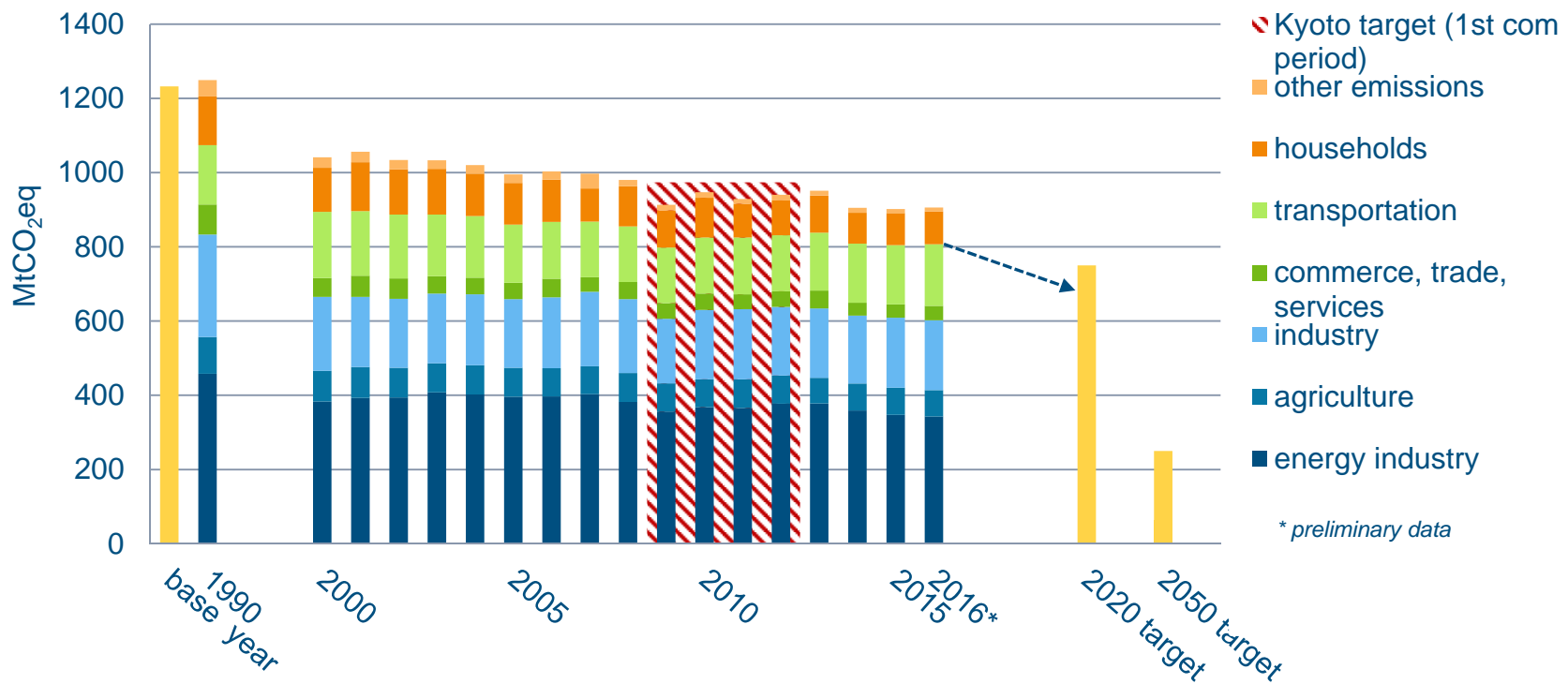
Germany

Katharina Grave

BMWi Referat IIIB1

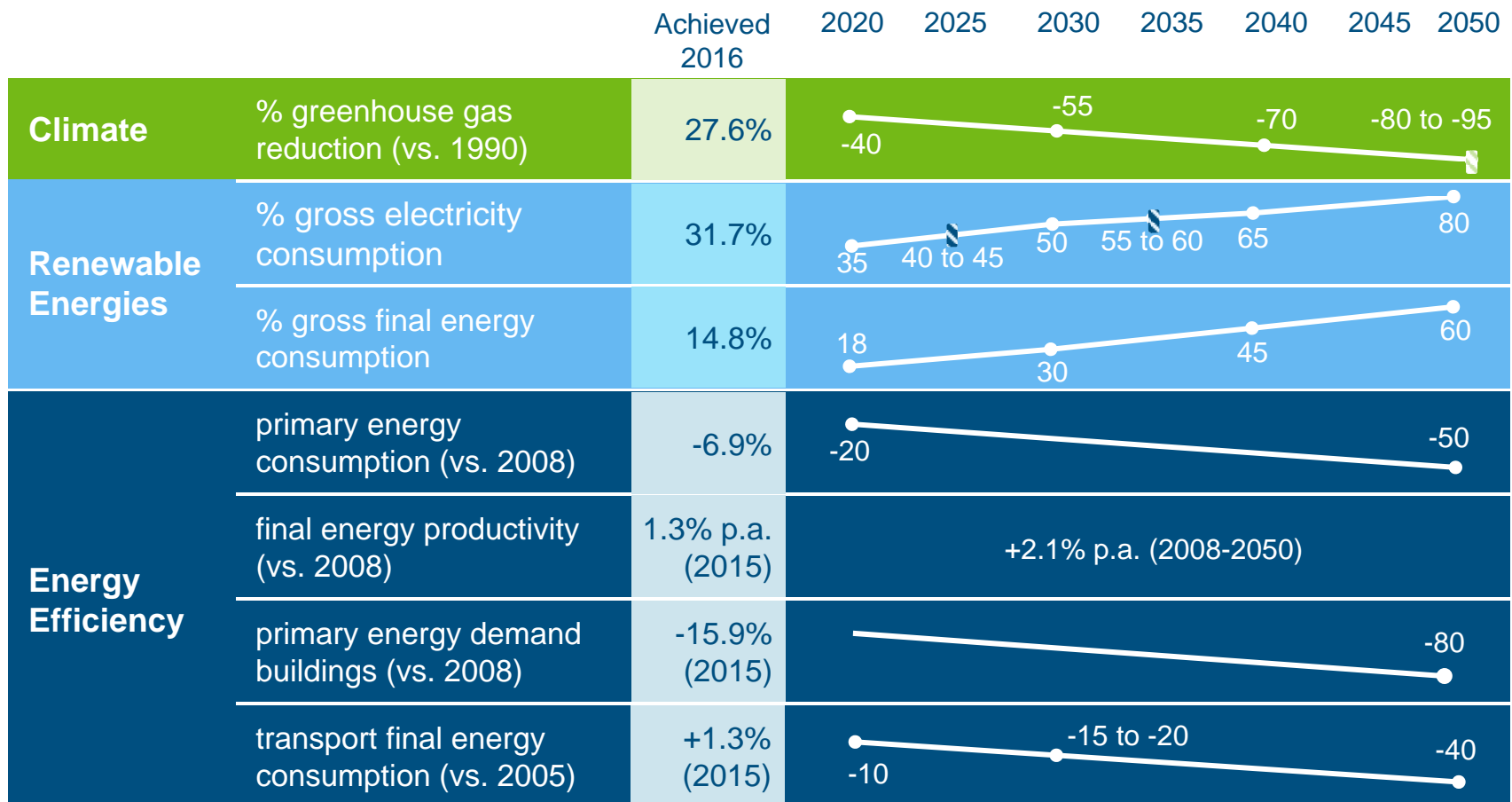
19.10.2017

The ultimate aim is to decrease emissions: the power sector is crucial



Source: UBA 2017

Several targets mark the political ambitions in different sectors



Source: BMWi 2016, UBA 2017

How to reach these targets is subject to many discussions, papers and round tables



Long term scenarios show potential paths towards a low carbon system

Langfristszenarien für die Transformation des Energiesystems in Deutschland

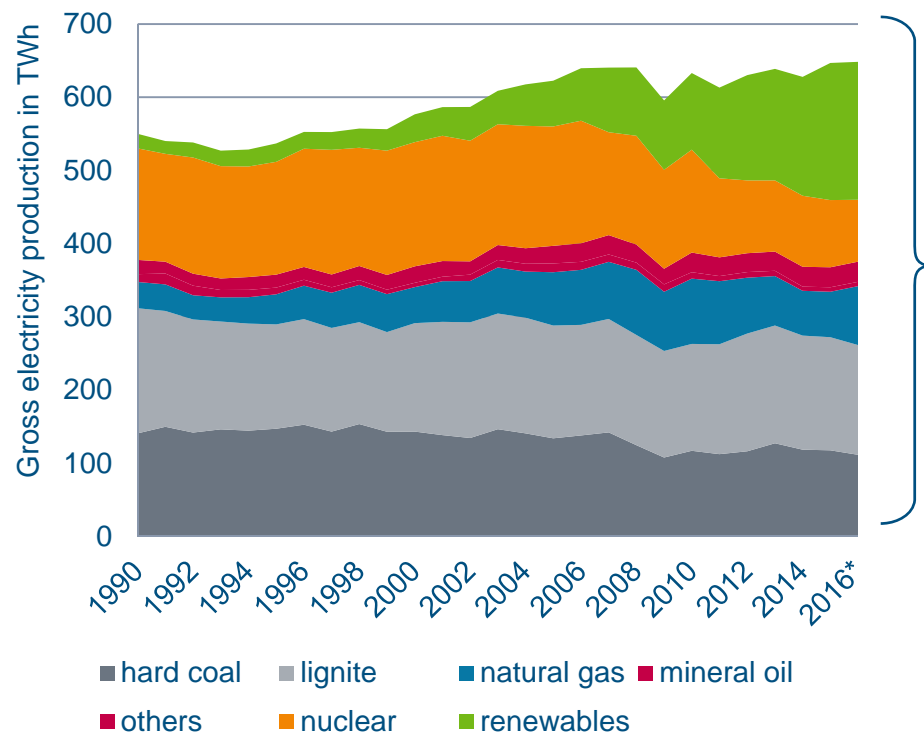
Modul 0: Zentrale Ergebnisse und Schlussfolgerungen
Studie im Auftrag des Bundesministeriums für Wirtschaft und Energie



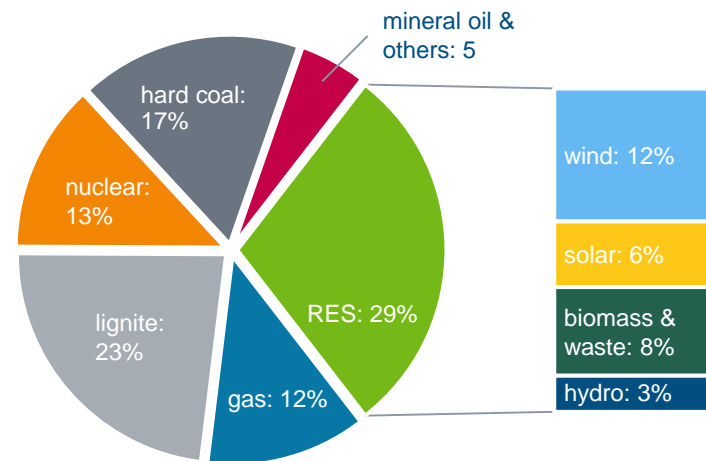
Fraunhofer
consentec
ifl

Projektleitung:
Fraunhofer ISI – Benjamin Pflüger
Consentec GmbH – Bernd Tentegeen
ifl – Bernd Franke

Starting point: Renewables have become Germany's No. 1 source of electricity

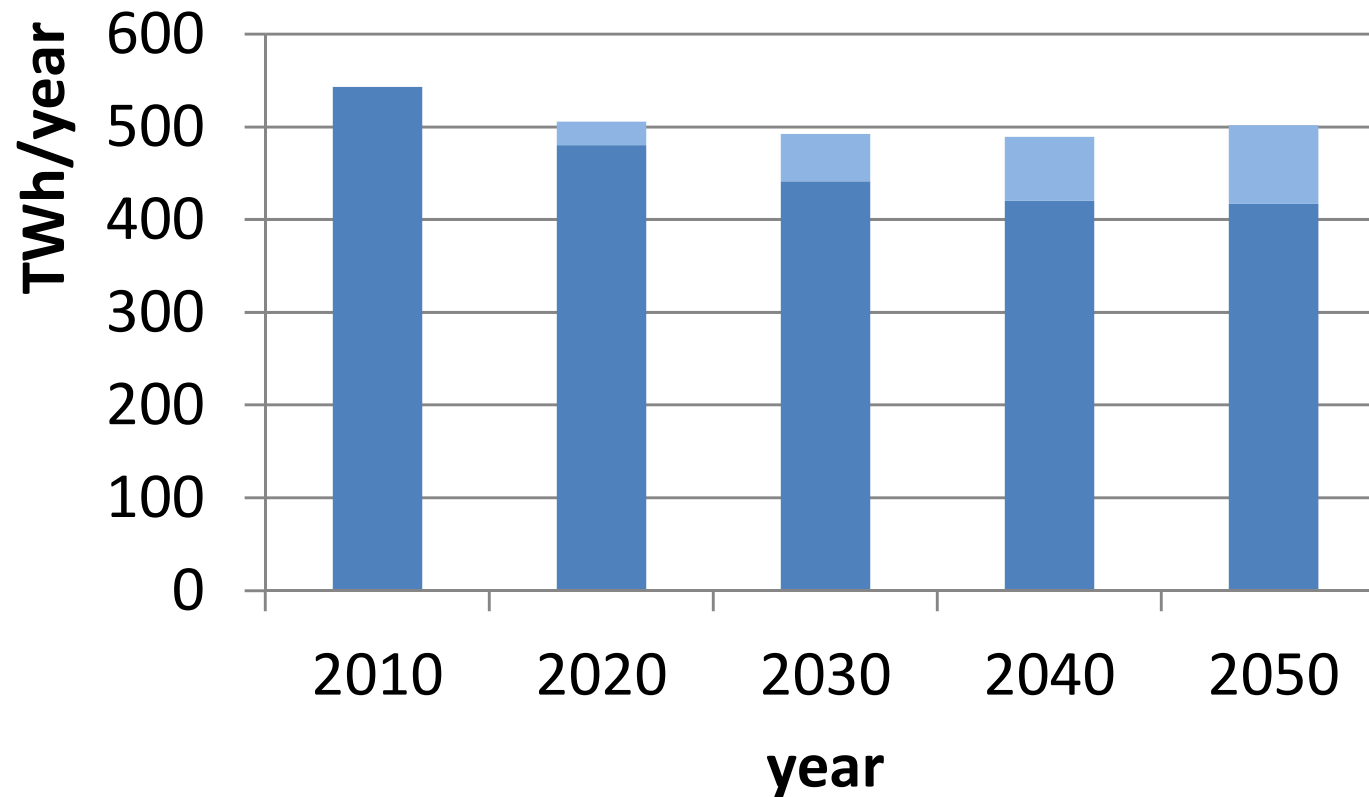


Electricity mix in 2016
(648.4 TWh in total)

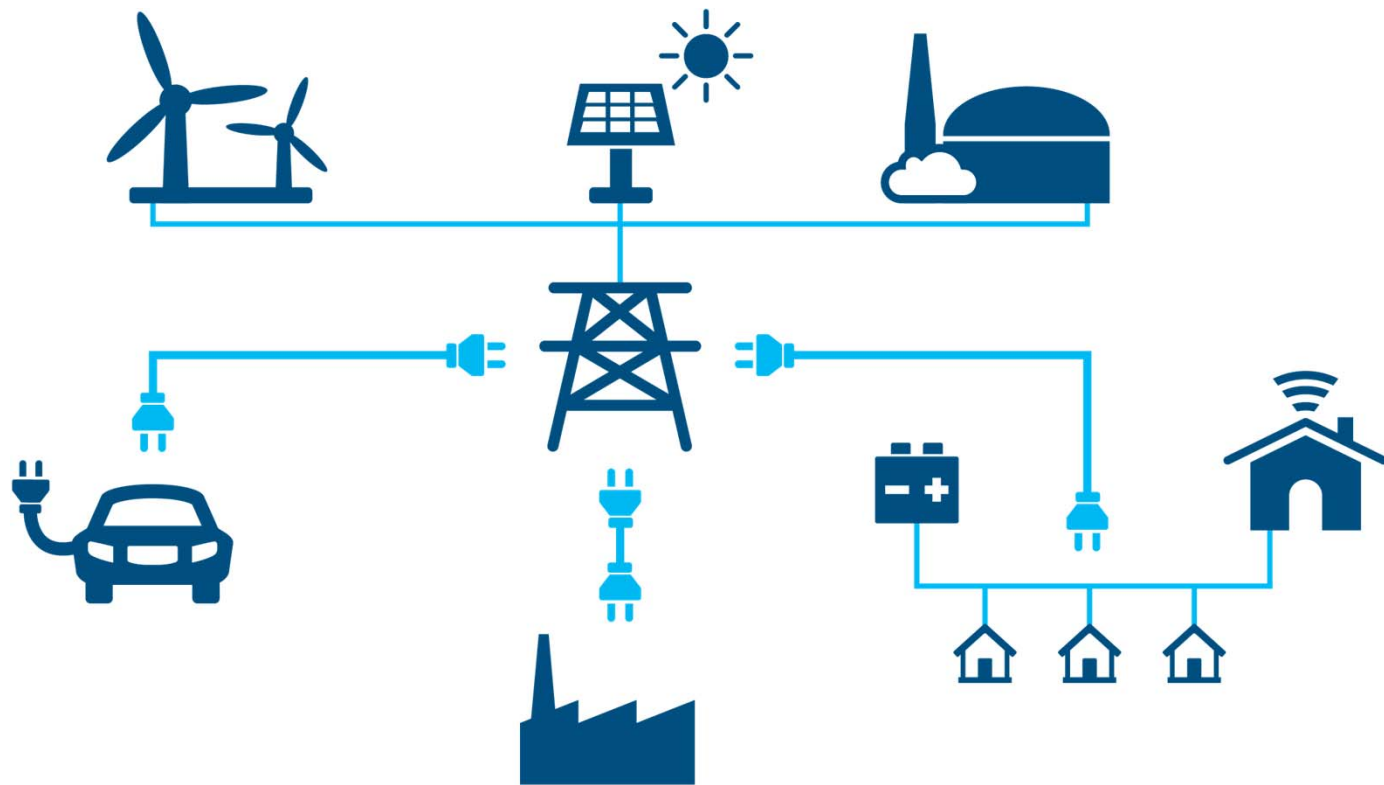


* preliminary data
rounded figures

Efficiency first: “classical” demand for electricity is expected to decrease

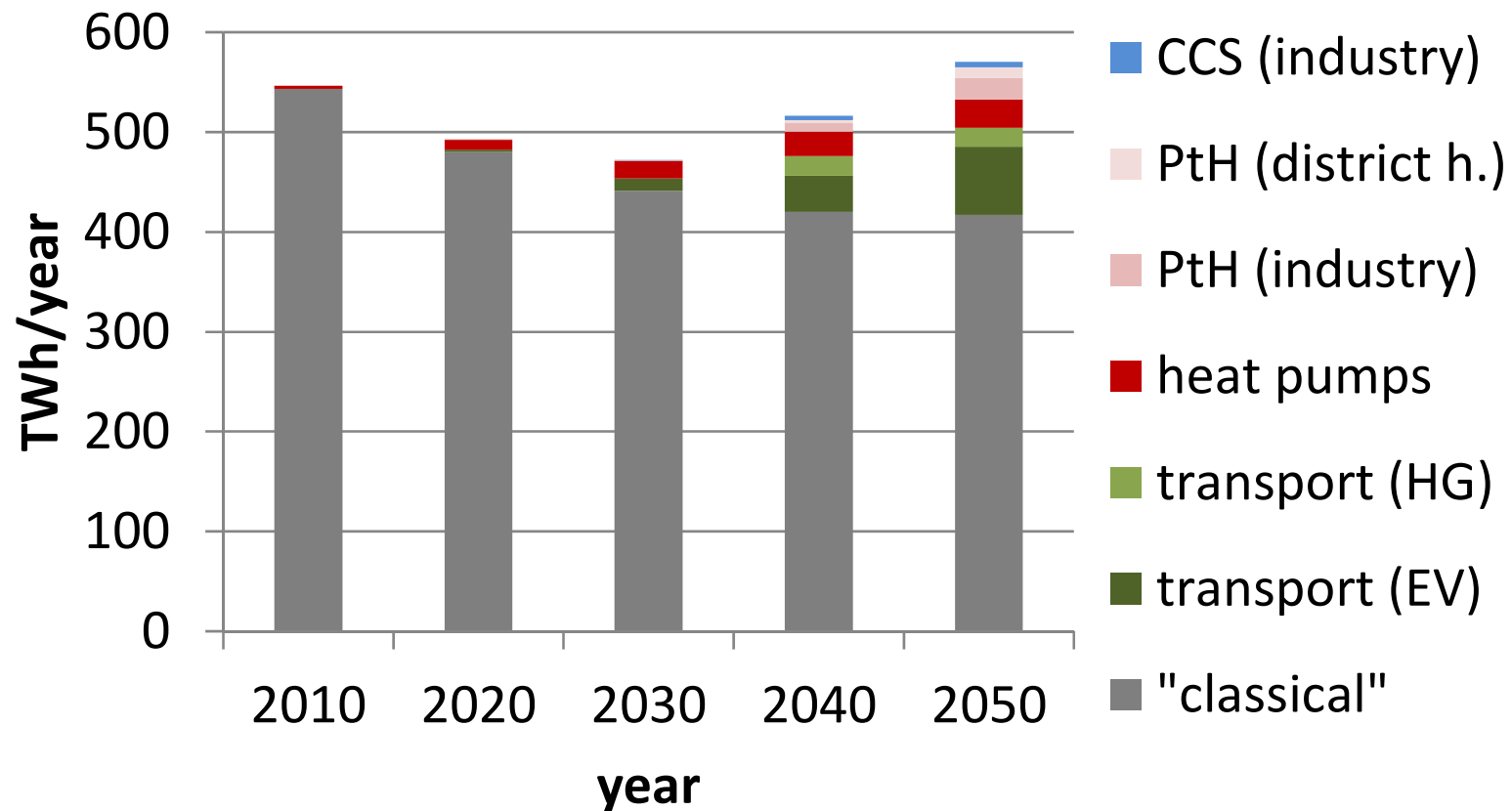


Decarbonising our energy systems leads to increased electrification of all sectors

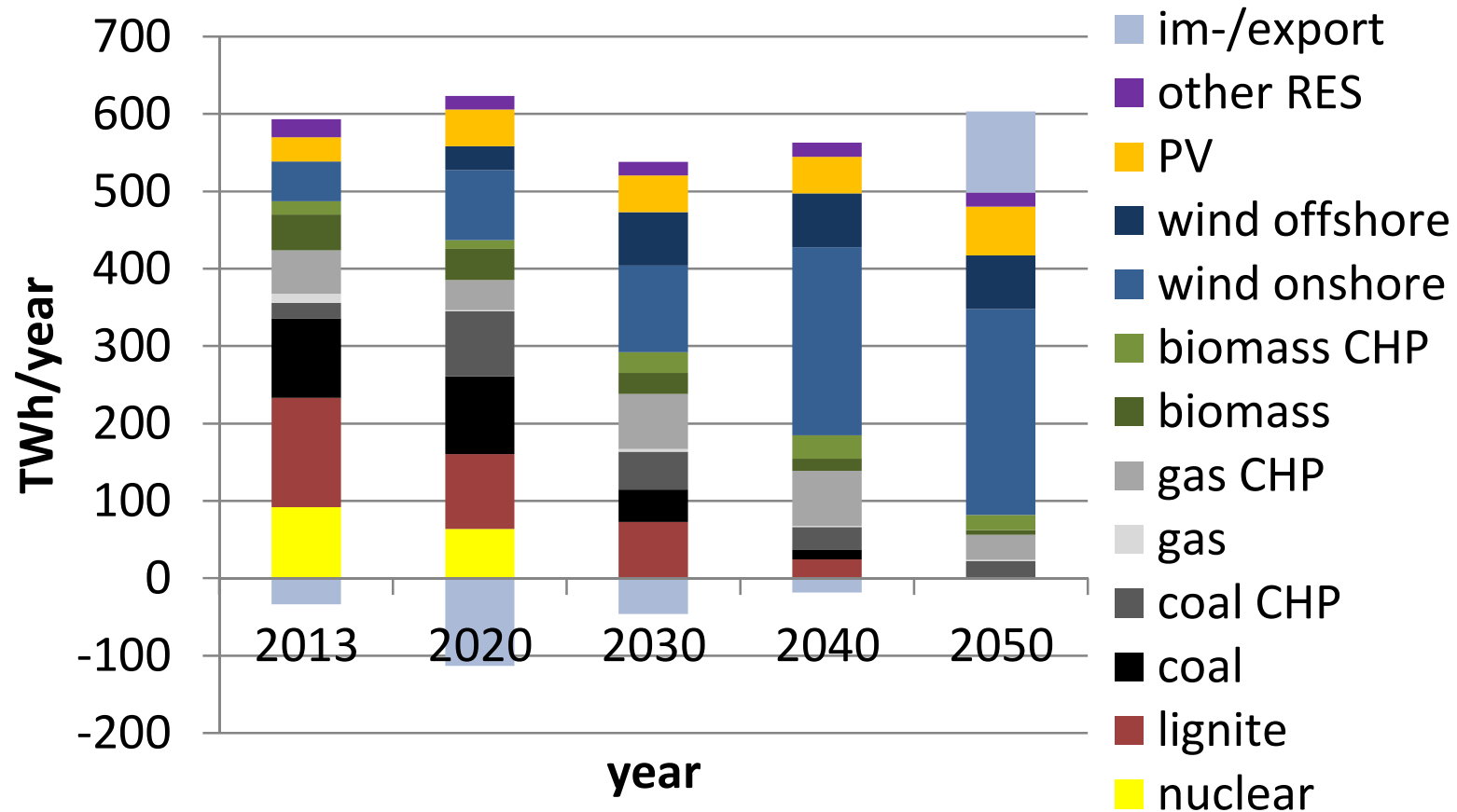


Source: Ecofys and Edelman.ergo 2016

Sector coupling: new demand from other sectors is expected to ramp up

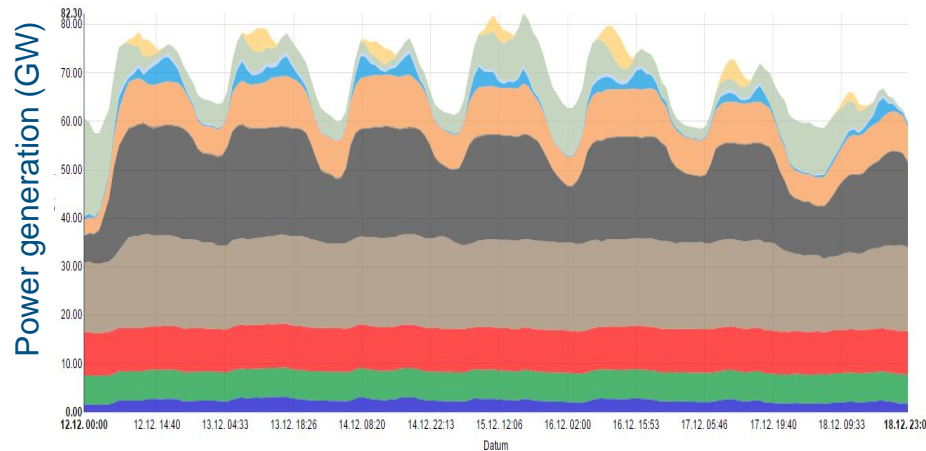


In a cost efficient scenario, renewables cover most of old and new demand for electricity

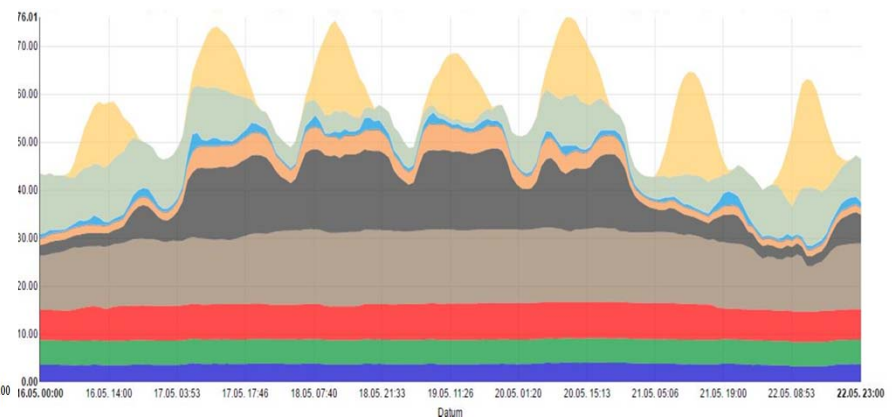


Renewable energy sources require flexibility from the system

Winter 2016
week no. 50 (December)

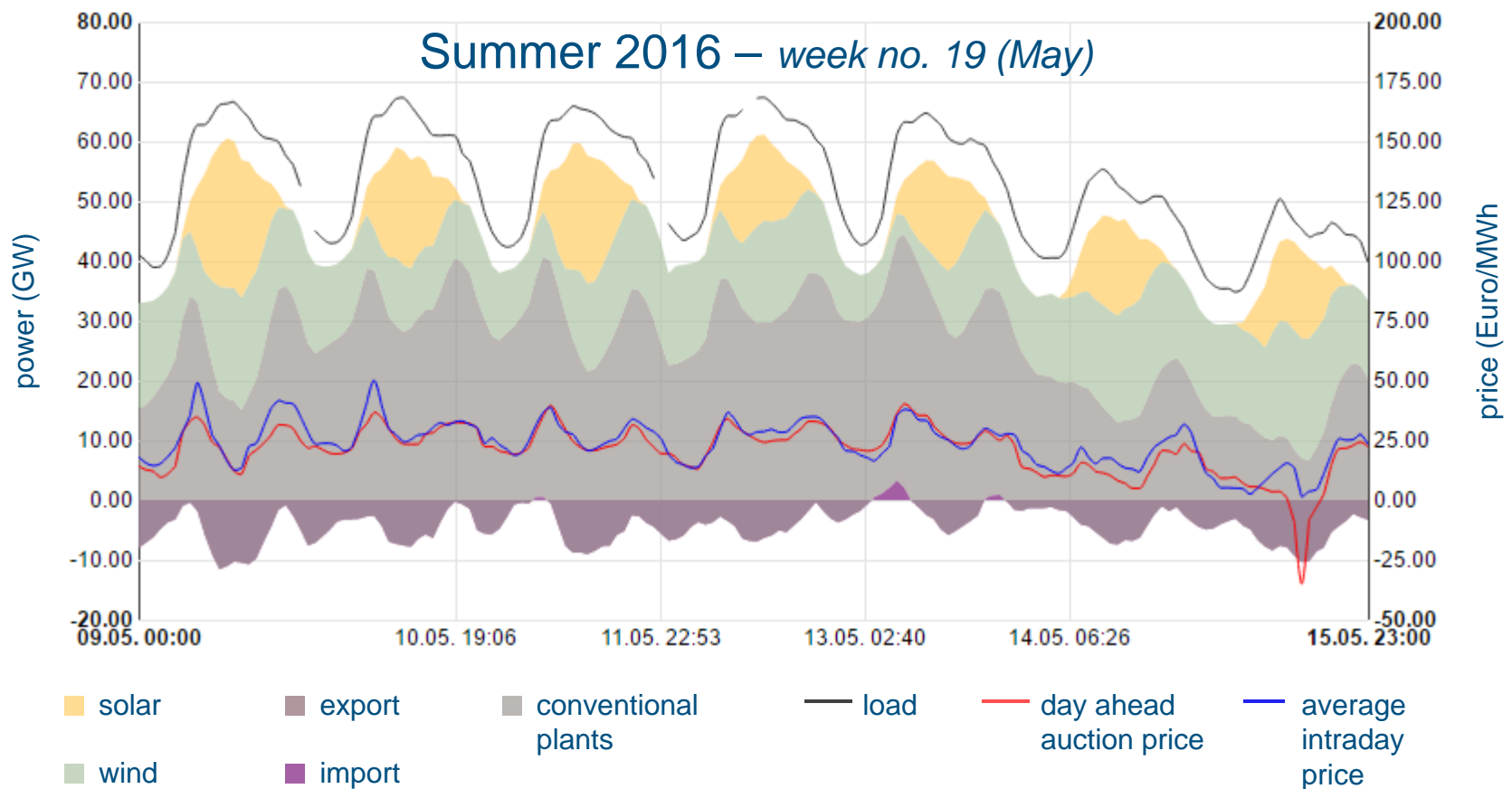


Summer 2016
week no. 20 (May)



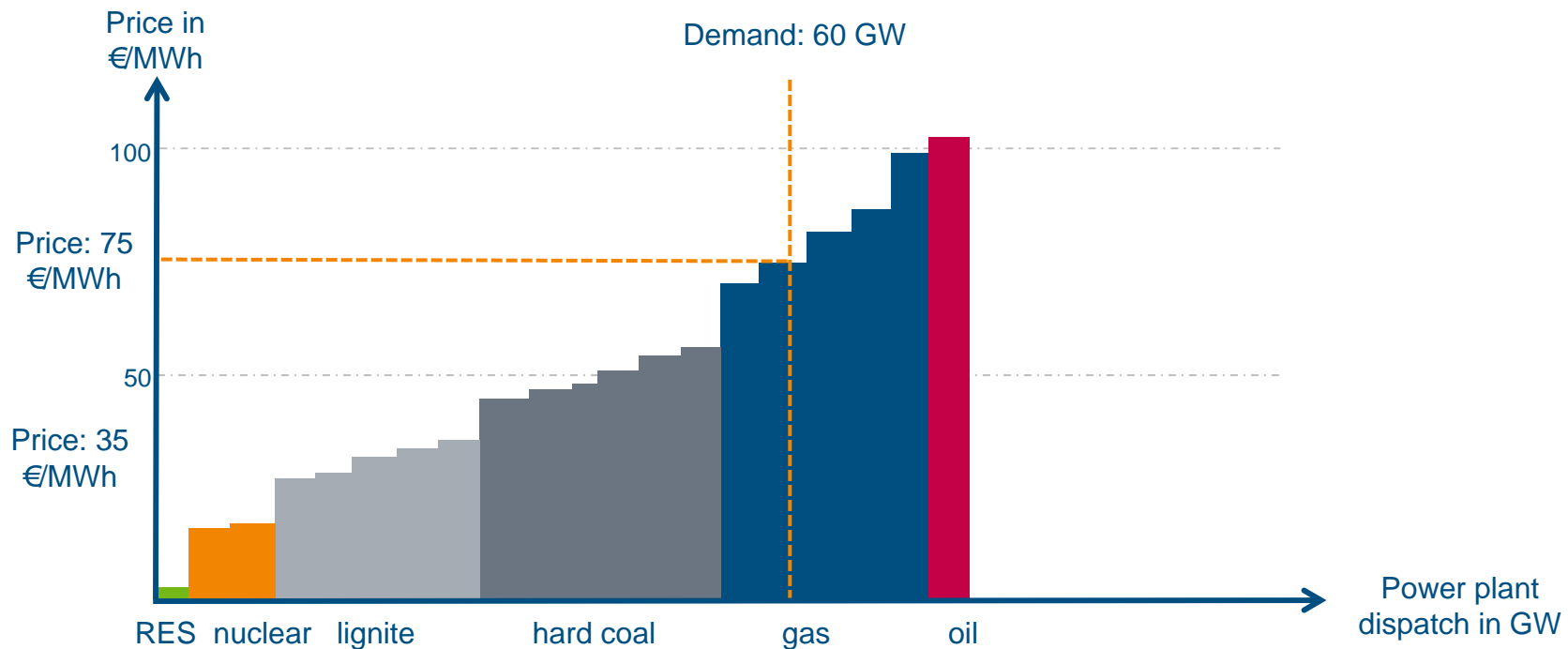
Source: Fraunhofer ISE 2016

Markets facilitate the integration of renewables system by incentivising flexibility



So far, the market results base on the marginal costs of thermal power production

Merit order (stylised)



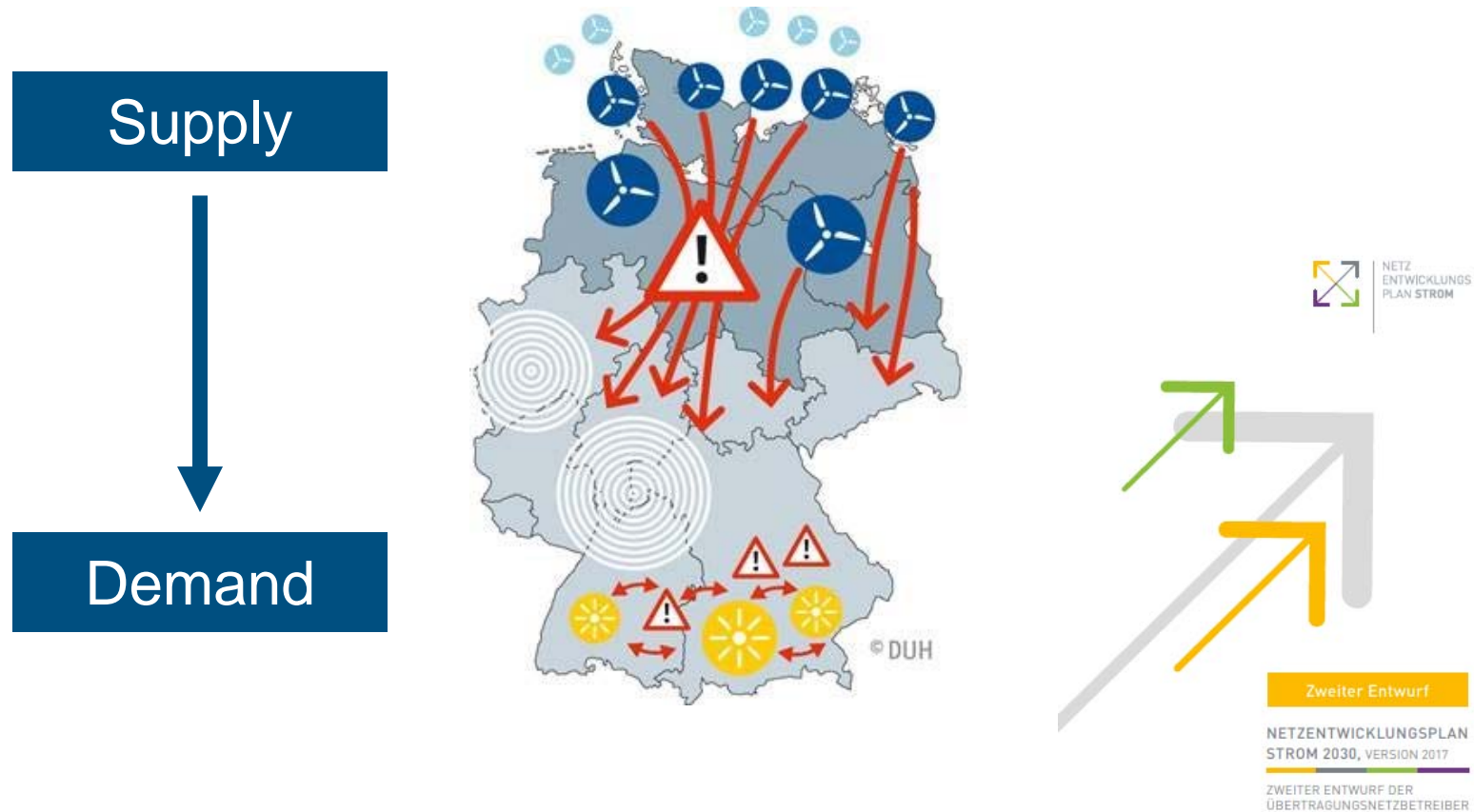
Source: Ecofys 2014

Germany recently reformed its electricity market system to facilitate flexibility

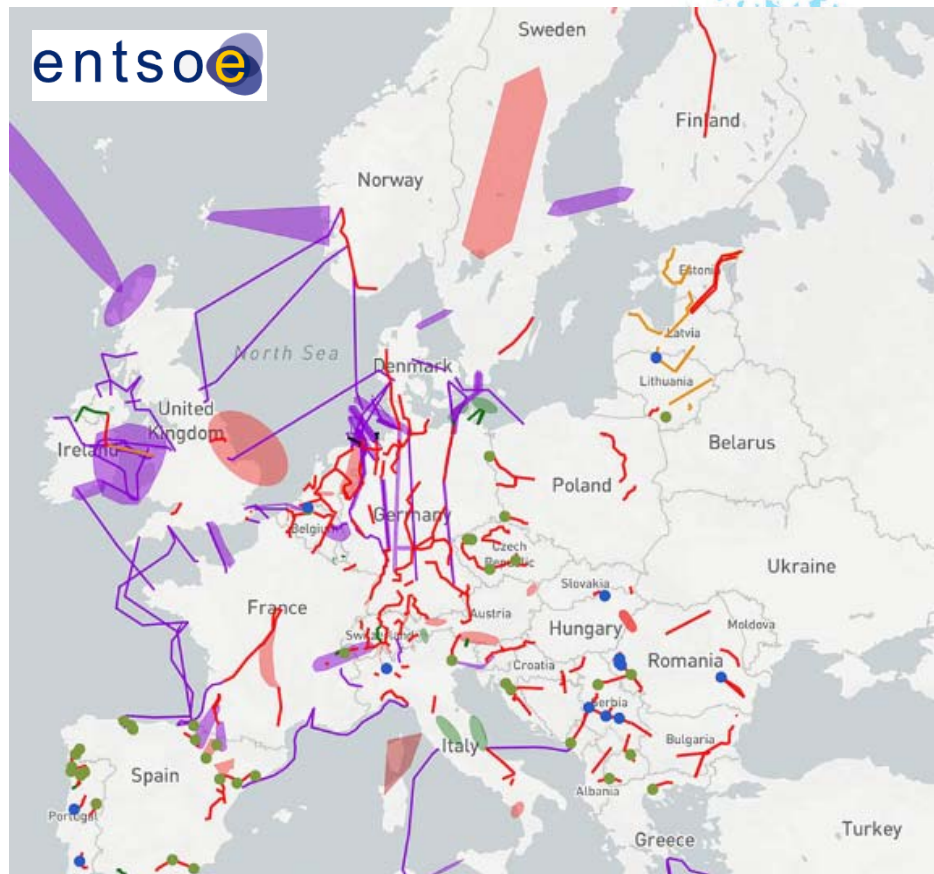
- Guaranteeing free price formation in wholesale markets (no price caps)
- Strengthening obligations to uphold schedules for demand and supply
- Shortening trade and balancing periods (to 15 minutes)
- Opening balancing markets for new providers
- Setting and clarifying rules for aggregators
- Gradually introducing smart meters
- Flexibilize power plants (especially combined heat and power production)

BMWi: White Paper (2016)

Markets need infrastructure to transport electricity from centers of supply to centers of demand



Grid extension is the cheapest way to balance renewables within Europe



Germany in Europe

- Population: 82 million (of 510 mio)
- Gross electricity production 2015: 647 TWh (of 3 234 TWh)
- Maximum demand: ~ 80 GW
- Technical interconnector capacity > 30 GW

Source: Eurostat



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Thank you for your attention

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